

# SEQUENCE LISTING



<110> Bujard, Hermann

<120> Method for producing recombinants  
intended for use in a complete Malaria antigen GP190/MSP1

<130> GRUE-003

<140> 09/269,874

<141> 1999-08-02

<150> PCT/EP97/05441

<151> 1997-10-02

<150> DE 19640817.2

<151> 1996-10-02

<160> 3

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 4920

<212> DNA

<213> Plasmodium falciparum

<400> 1

atgaagatca	tattcttttt	atgttcattt	ctttttttta	ttataaatac	acaatgtgta	60
acacatgaaa	gttatcaaga	acttgtcaaa	aaactagaag	ctttagaaga	tgacagtattg	120
acagggtata	gtttatttca	aaaggaaaaa	atggtattaa	atgaaggaac	aagtgggaaca	180
gctgttacaa	ctagtacacc	tggttcaaag	gggttcagttg	cttcaggtgg	ttcaggtggc	240
tcagttgctt	caggtggctc	agttgcttca	gggtggctcag	ttgcttcagg	tggttcagtt	300
gcttcaggtg	gttcaggtaa	ttcaagacgt	acaaatcctt	cagataattc	aagtgattca	360
gatgctaaat	cttacgctga	tttaaaacac	agagtacgaa	attacttggt	aactatcaaa	420
gaactcaaat	atcctcaact	ctttgattta	actaatcata	tgtaactttt	gtgtgataat	480
attcatgggt	tcaaatattt	aattgatgga	tatgaagaaa	ttaatgaatt	attatataaa	540
ttaaactttt	attttgattt	attaagagca	aaattaaatg	atgtatgtgc	taatgattat	600
tgtcaaatac	ctttcaatct	taaaattcgt	gcaaatgaat	tagacgtact	taaaaaactt	660
gtgttcggat	atagaaaacc	attagacaat	attaaagata	atgtaggaaa	aatggaagat	720
tacattaaaa	aaaataaaaa	aaccatagaa	aatataaatg	aattaattga	agaaagtaag	780
aaaacaattg	ataaaaaata	gaatgcaact	aaagaagaag	aaaaaaaaaa	attataccaa	840
gctcaatatg	atctttctat	ttacaataaa	caattagaag	aagcacataa	tttaataagc	900
gttttagaaa	aacgtattga	cacttttaaa	aaaaatgaaa	acattaagga	attacttgat	960
aagataaatg	aaattaaaaa	tccccaccg	gccaatctctg	gaaatacacc	aaatactctc	1020
cttgataaga	acaaaaaaat	cgaggaacac	gaaaaagaaa	taaaagaaat	tgccaaaact	1080
attaaattta	atattgatag	tttattttact	gatccacttg	aattagaata	ctattttaaga	1140
gaaaaaaata	aaaatattga	tataagtgc	aagggtgaaa	caaaggaatc	aactgaaccc	1200
aatgaatatc	caaatggagt	tacttatcct	ttgtcatata	acgatattaa	caatgcttta	1260
aatgaactta	attcttttgg	tgattttaatt	aatccatttg	attatacaaa	agaaccaagt	1320
aaaaacatat	atactgataa	tgaaagaaaa	aaattcataa	atgaaattaa	ggaaaaaatt	1380
aaaatagaaa	aaaaaaaat	tgaatctgat	aaaaaatctt	acgaagacag	atctaagtct	1440
ttaaatgata	taacaaaaga	atatgaaaaa	ttacttaatg	aaatttatga	tagcaaatct	1500
aataataata	tagattttaac	taatttcgaa	aaaatgatgg	gtaaaagata	ttcatataaa	1560
gttgagaaac	ttacacacca	taatactttt	gcacacctatg	aaaattctaa	acataatctt	1620
gaaaagttaa	caaaagctct	taaatatatg	gaagattatt	ctttaaggaa	tatagtagtt	1680

gaaaaagaat	taaaatatta	taaaaatttta	ataagcaaaa	tagaaaaatga	gattgaaaca	1740
ttagttgaaa	atattaaaaa	agatgaagaa	cagctttttg	aaaaaaaaaat	tactaaagac	1800
gaaaataaac	cagatgaaaa	aatttttagaa	gtatctgaca	ttgtaaaaagt	acaagttcaa	1860
aaagttttat	taatgaacaa	aattgacgaa	ttaaaaaaga	ctcaattgat	tttaaaaaat	1920
gtagaattaa	aacataatat	acatgttccc	aattcttaca	aacaagaaaa	taagcaagaa	1980
ccttattatt	taattgtgtt	gaaaaaagaa	attgataaat	taaaagtgtt	catgcctaag	2040
gtagaatcat	tgataaatga	agaaaaaaa	aacataaaaa	cagaagggtca	atcggataat	2100
tcggaaccat	caaccgaagg	agaaataaca	ggacaagcaa	ctacaaaacc	tggacaacaa	2160
gcaggatctg	ctttagaagg	agattcagta	caagcacaag	cacaagaaca	aaaacaagca	2220
caaccaccag	taccagtacc	agtaccagaa	gcaaaagcac	aagtcccaac	accaccagca	2280
ccagtaataa	ataaaaactga	aaatgtttcc	aaattagatt	atcttgaaaa	attatatgaa	2340
tttttaataa	cttcataatat	atgtcacaaa	tatatatttg	tttcacactc	aactatgaac	2400
gaaaagatat	taaaacaata	taaaattaca	aaggaggaag	aaagcaaatt	aagttcatgt	2460
gatccattag	acttattgtt	taataatacaa	aataacatac	ctgtaatgta	ttctatgttt	2520
gatagcttaa	acaatagttt	atcacaaacta	tttatggaaa	tttatgaaaa	agaaatgggt	2580
tgtaatttat	ataaacctaa	ggataatgac	aaaattaaaa	atttattaga	ggaagcgaaa	2640
aaagtatcca	catctgtaaa	aactctttca	agttcatcaa	tgcaaccatt	atcattaaca	2700
cctcaggata	aaccggaagt	aagtgcaaat	gtgatatacat	cacatttctac	aaatttgaat	2760
aatagtttaa	aattatttga	aaacatattg	agtcttgtaa	aaaacaaaaa	tatatacca	2820
gaattaatag	gtcaaaaaag	tagtgaaaaac	ttttatgaaa	agatattaaa	agatagtgat	2880
acattttata	atgaatcttt	tacaaatttt	gtaaaaatcta	aagctgatga	tattaattca	2940
ttgaatgatg	aatcaaaaag	gaagaaatta	gaagaagata	ttaataaatt	aaaaaaaact	3000
ttacagttat	catttgattt	atataataaaa	tataaattaa	aattagaaaag	attattttgat	3060
aaaaagaaaa	cagttggtaa	atataaaatg	caaattaaaa	aacttacttt	attaaaagaa	3120
caattagaat	caaaattgaa	ttcacttaata	aacccaaaagc	atgtattaca	aaacttttct	3180
gttttcttta	acaaaaaaa	agaagctgaa	atagcagaaa	ctgaaaacac	attagaaaac	3240
acaaaaatat	tattgaaaca	ttataaagga	cttgttaaat	attataatgg	tgaatcatct	3300
ccattaaaaa	ctttaagtga	agaatcaatt	caaacagaag	ataattatgc	cagtttagaa	3360
aactttaaag	tattaagtaa	attagaagga	aaatttaaagg	ataattttaa	tttagaaaag	3420
aaaaaattat	catacttatc	aagtggatta	catcatttaa	ttgctgaatt	aaaagaagta	3480
ataaaaaata	aaaattatac	aggttaattct	ccaagtga	ataatacggg	tgtaacaat	3540
gcattagaat	cttacaaaaa	atttctccca	gaaggaacag	atgttgcaac	agttgtaagt	3600
gaaagtggat	ccgacacatt	agaacaaaagt	caaccaaaaga	aaccagcatc	aactcatgta	3660
ggagcagagt	ctaacacaa	aacaacatca	caaaatgtcg	atgatgaagt	agatgacgta	3720
atcatagtac	ctatatgttg	agaatccgaa	gaagattatg	atgatttagg	acaagtagta	3780
acaggagaag	cagtaactcc	ttccgttaatt	gataacatac	tttctaaaaa	tgaaaatgaa	3840
tatgaggttt	tatatttaaa	accttttagca	ggtgtttata	gaagttttaa	aaaacaatta	3900
gaaaataacg	ttatgacatt	taatgttaaat	tttaaggata	ttttaaattc	acgatttaaat	3960
aaacgtgaaa	atttcaaaaa	tgtttttagaa	tcagatttaa	ttccatataa	agatttaaca	4020
tcaagtaatt	atgttgtcaa	agatccatat	aaatttctta	ataaaagaaa	aagagataaa	4080
ttcttaagca	gttataatta	tattaaggat	tcaatagata	cggatataaa	ttttgcaaat	4140
gatgttcttg	gatattataa	aatatttatcc	gaaaaatata	aatcagattt	agattcaatt	4200
aaaaaatata	tcaacgacaa	acaaggtgaa	aatgagaaat	accttccctt	tttaaacaa	4260
attgagacct	tatataaaac	agttaatgat	aaaattgatt	tatttgtaat	tcatttagaa	4320
gcaaaagttc	taaattatac	atatgagaaa	tcaaacgtag	aagttaaaat	aaaagaactt	4380
aattacttaa	aaacaattca	agacaaattg	gcagatttta	aaaaaaaata	caatttcggt	4440
ggaattgctg	atttatcaac	agattataac	cataataact	tattgacaaa	gttccttagt	4500
acaggtatgg	tttttgaaaa	tcttgctaaa	accgttttat	ctaattttact	tgatggaaac	4560
ttgcaaggta	tgtaaacaat	ttcacaaacac	caatgcgtaa	aaaaacaatg	tccacaaaat	4620
tctggatgtt	tcagacattt	agatgaaaga	gaagaatgta	aatgtttatt	aaattacaaa	4680
caagaagggtg	ataaatgtgt	tgaaaatcca	aatcctactt	gtaacgaaaa	taatgggtgga	4740
tgtgatgcag	atgccaaaatg	taccgaagaa	gattcaggta	gcaacggaaa	gaaaatcaca	4800
tgtgaatgta	ctaaacctga	ttcttatcca	cttttcgatg	gtattttctg	cagttcctct	4860
aacttcttag	gaatatcatt	cttattaata	ctcatgttaa	tattatacac	tttcatttaa	4920

<210> 2  
 <211> 4940  
 <212> DNA  
 <213> Plasmodium falciparum

<400> 2

cgcacgcgta	tgaaaatcat	tttcttcctc	tggttcatttc	tgtttttttat	catcaataact	60
cagtgcgtga	cccacgaatc	ctatcaggag	ctgggttaaga	aactggaagc	tttgaagat	120
gccgtcctta	ccgatacag	cctgttccag	aaggagaaga	tggtgctgaa	tgaagggacg	180
agtggcacgg	ccgttacaac	cagcacaccc	ggttctaaag	ggctctgtggc	tagcgggtggc	240
tccgggtgggt	ctgtggcctc	tgggggttcc	gtcgcctccg	gcggcagcgt	ggcatcaggt	300
ggctcagtgg	caagcggcgg	ttccgggaac	agtcgaagaa	ccaatccatc	tgacaactct	360
agcgattccg	acgccaaatc	ctacgccgac	ctcaagcacc	gagtgagaaa	ctatctcctc	420
actatcaagg	agctgaagta	cccacagttg	ttcgacctca	ctaatacatat	gctgacactg	480
tgtgataaca	ttcatggctt	caaataatctg	attgacgggt	acgaagagat	caatgaactc	540
ctgtacaagt	tgaatttcta	cttcgacttg	ctaagggcca	aactgaatga	cgtttgccgc	600
aatgactatt	gtcaaattcc	attcaatttg	aagatcagag	ccaacgagtt	ggacgtattg	660
aagaagtgtg	tcttcggata	tcgcaagcct	ctcgacaaca	tcaaggacaa	tgtgggaaaag	720
atggaagtatt	atattaaaaa	gaataagaag	accatcgaga	acattaacga	gctgatcgaa	780
gaatccaaaa	agaccataga	caaaaataag	aatgcaacca	aggaggaaga	aaagaagaag	840
ttgtaccagg	cccagtagca	cctgtccatc	tataacaaac	agcttgaaga	agcccataac	900
ctcatcagcg	tactggagaa	gcgcatagac	accctcaaga	agaatgaaaa	tatcaaagaa	960
ctgctcgaca	agattaatga	aattaagaat	cctccgccag	ccaactctgg	gaacacccct	1020
aacacgctgc	tggacaagaa	caagaagata	gaggagcacg	agaaagagat	caaagagatc	1080
gccaaaacca	ttaagttcaa	catagattct	ctctttactg	atccccctga	gctggagtac	1140
tacttgagag	agaagaataa	gaatatagac	atctccgcc	aagtcgagac	aaaggaatca	1200
accgaaccta	atgaatatcc	caatgggtgtg	acgtaccctc	tgtcttataa	cgatatcaac	1260
aacgctctca	acgagctcaa	tagcttcgggt	gacttgatta	accccttcga	ttatacgaaa	1320
gaaccctcta	agaatatcta	cacagacaat	gagagaaaga	agtttatcaa	cgaaatcaag	1380
gagaagatca	aaattgagaa	gaagaaaatt	gagagtgaac	agaaaagtta	cgaagaccgc	1440
agcaaaaagtc	taaacgatat	cactaaagag	tatgaaaagc	tgctgaacga	gatctatgat	1500
tccaaattca	acaataacat	cgacctgacc	aacttcgaga	aatgatggg	aaaacggtag	1560
tcttacaag	tggagaaact	gacacaccat	aatacctttg	catcctatga	gaattctaag	1620
cataatcttg	agaagctcac	caaagctctt	aagtatatgg	aggactattc	tctgcggaac	1680
attggtgtgg	agaaagaact	aaagtattac	aagaatctca	taagtaagat	cgaaaacgag	1740
atcgagacgc	ttgttgagaa	cattaagaag	gatgaagaac	agttgtttga	gaagaagatt	1800
acaaaagacg	aaaataaac	agatgagaag	atcctggagg	tctccgatat	tgttaaaagtc	1860
caagtgcaga	aggtgtcctc	catgaacaag	attgatgaac	tcaagaagac	tcaactcatt	1920
ctgaagaacg	tggagttaaa	acataatata	catgtgccga	atagttataa	gcaggagaat	1980
aagcaggaac	catactacct	catcgtactc	aagaaagaga	tagacaaact	gaaagtgttc	2040
atgcccaaag	tcgagagcct	gatcaacgaa	gagaagaaga	acattaaaac	tgaaggacag	2100
tcagataact	ccgagccttc	cacagaagga	gagataaccg	gacaggctac	caccaagccc	2160
ggacaacagg	ccggttcagc	tctcgaaggc	gatagcgtgc	aagctcaagc	acaagagcag	2220
aagcaggcac	agcctccagt	gccagtgcc	gttccagagg	ctaaagctca	agtgccctaca	2280
ccaccagctc	ctgtgaataa	caagaccgag	aatgtcagca	aactggacta	ccttgagaag	2340
ctctatgagt	tcctgaatac	atcctacatc	tgccacaaat	atatcctcgt	ctctcacagc	2400
actatgaacg	agaagattct	taaacagtac	aagataacca	aggaagagga	gagtaaactg	2460
tcctcttggtg	atccactgga	cctgctgttc	aatatccaga	acaacattcc	cgttatgtat	2520
tctatgttcg	atagcctcaa	caattctctc	tctcaactgt	tcatggagat	atatgagaag	2580
gagatggtct	gcaacctgta	taaactcaaa	gacaacgaca	agattaagaa	ccttctggag	2640
gaagctaaga	aggtctccac	ctctgtttaa	actctctctt	ccagctccat	gcaaccactg	2700
tctctcacac	ctcaagacaa	gcccgaagtg	agcgctaacg	acgacacctc	tactcgacc	2760
aaccttaata	actcactgaa	actgtttgag	aacatcctgt	ctctcggcaa	gaataagaac	2820
atctaccaag	aacttattgg	acagaaatcg	tccgagaact	tctacgagaa	gatactgaaa	2880
gacagcgaca	cattctataa	cgagagcttc	actaaactcg	tgaaatctaa	agccgatgat	2940
atcaactctc	ttaacgatga	atctaaacgt	aagaagctgg	aagaggacat	caataagctg	3000
aagaagacac	tgcaactgag	cttcgacctg	tacaacaagt	acaaactgaa	actggagaga	3060
ctcttcgaca	agaagaagac	agtcggcaag	tataagatgc	agatcaagaa	gttgactctg	3120

ctcaaggagc	agcttgaaag	caaactcaac	tcaactgaaca	atccgaaaca	cgtactgcag	3180
aacttctcag	tggtcttcaa	caagaagaag	gaagccgaga	tgcgccgagac	agagaacact	3240
ctggagaaca	ccaagattct	tctcaaacac	tacaaaggcc	tcgtaagta	ttataatggc	3300
gagtcttctc	ctctgaagac	tctctccgag	gagagcatcc	agaccgagga	taactacgcc	3360
agcctcgaga	acttcaaggt	cctgtctaag	ctcgaaggca	agctgaagga	caacctgaac	3420
ctggagaaga	agaagctcag	ctacctctct	agcggactgc	atcacctgat	cgccgagctc	3480
aaggaagtca	ttaagaacaa	gaactacacc	ggcaatagcc	caagcgagaa	taatacagac	3540
gtgaataacg	cactggaatc	ttacaagaag	ttcctgcctg	aaggaacaga	tgtcgccact	3600
gtgggtgtctg	aatctggctc	cgacacactg	gagcagtctc	aacctaaagaa	gcctgcatct	3660
actcatgtcg	gagccgagtc	caatacaatt	accacatctc	agaacgtcga	cgatgaggtc	3720
gatgacgtca	tcatgtgtcc	tatcttcggc	gagagcgagg	aggactacga	tgacctcggc	3780
caggtggtca	ccggtgaggc	tgtaactcct	tccgtgattg	ataacattct	gtccaaaatc	3840
gagaacgaat	acgaagtgtc	ctatctgaaa	cctctggcag	gcgtctatag	gtctctcaag	3900
aaacagctgg	agaataacgt	gatgaccttc	aatgtcaacg	tgaaggacat	tctgaacagc	3960
cgctttaata	agagagaaaa	tttcaagaac	gtcttggaga	gcgacttgat	tccctataaa	4020
gacctgacct	cctctaacta	cgttgtcaag	gacccataca	agttcctcaa	taaagagaag	4080
agggataaat	ttctgtctag	ttacaactat	atcaaggact	ccatcgacac	cgatatcaat	4140
ttcgctaattg	atgtgtctggg	gtattacaag	atcctgagcg	aaaaatacaa	gtctgacctt	4200
gactctatta	aaaagtatat	caacgataag	caaggcgaga	atgaaaaata	tctgcccctt	4260
ctgaataaca	tcgaaacctt	gtacaagaca	gtgaacgaca	aaatcgacct	cttcgtaatt	4320
cacctggagg	ccaaggtcct	caactatact	tacgagaaga	gcaatgtgga	agttaaaatc	4380
aaggagctga	actacctcaa	aacaatccaa	gacaagctgg	cagatttcaa	gaaaaataac	4440
aatttcgtcg	gaattgcaga	cctgtctacc	gattataacc	acaacaatct	cctgaccaag	4500
tttctgtcca	ctggcatggt	gttcgaaaac	ctcgccaaaa	cagtgtgtgag	caatctgtct	4560
gacggcaacc	tgcagggcat	gctgaacatc	tcccagcacc	aatgcgtgaa	gaaacagtgc	4620
ccccagaata	gcggctgttt	caggcatctg	gacgagcgcg	aagagtgcaa	gtgtctcctg	4680
aactacaaac	aagaaggaga	taagtgcgtg	gagaacccaa	accctacctg	caatgaaaac	4740
aatggcgggt	gtgacgccga	tgctaaatgc	accgaggaag	acagcggctc	taacggaaag	4800
aaaatcacat	gcgagtgtac	taagcccagc	tcctatccac	tcttcgacgg	gattttttgc	4860
tccagctcta	atttcctggg	catctccttc	ctgctgatcc	tcatgctgat	cctgtacagc	4920
ttcatcta	agatcgatgg					4940

<210> 3

<211> 1639

<212> PRT

<213> Plasmodium falciparum

<400> 3

Met	Lys	Ile	Ile	Phe	Phe	Leu	Cys	Ser	Phe	Leu	Phe	Phe	Ile	Ile	Asn
1				5					10					15	
Thr	Gln	Cys	Val	Thr	His	Glu	Ser	Tyr	Gln	Glu	Leu	Val	Lys	Lys	Leu
			20					25					30		
Glu	Ala	Leu	Glu	Asp	Ala	Val	Leu	Thr	Gly	Tyr	Ser	Leu	Phe	Gln	Lys
		35					40					45			
Glu	Lys	Met	Val	Leu	Asn	Glu	Gly	Thr	Ser	Gly	Thr	Ala	Val	Thr	Thr
		50				55					60				
Ser	Thr	Pro	Gly	Ser	Lys	Gly	Ser	Val	Ala	Ser	Gly	Gly	Ser	Gly	Gly
65					70				75					80	
Ser	Val	Ala	Ser	Gly	Gly	Ser	Val	Ala	Ser	Gly	Gly	Ser	Val	Ala	Ser
			85					90					95		
Gly	Gly	Ser	Val	Ala	Ser	Gly	Gly	Ser	Gly	Asn	Ser	Arg	Arg	Thr	Asn
		100					105					110			
Pro	Ser	Asp	Asn	Ser	Ser	Asp	Ser	Asp	Ala	Lys	Ser	Tyr	Ala	Asp	Leu
		115					120					125			
Lys	His	Arg	Val	Arg	Asn	Tyr	Leu	Leu	Thr	Ile	Lys	Glu	Leu	Lys	Tyr
	130					135					140				
Pro	Gln	Leu	Phe	Asp	Leu	Thr	Asn	His	Met	Leu	Thr	Leu	Cys	Asp	Asn
145					150					155					160

Ile	His	Gly	Phe	Lys	Tyr	Leu	Ile	Asp	Gly	Tyr	Glu	Glu	Ile	Asn	Glu	
				165					170					175		
Leu	Leu	Tyr	Lys	Leu	Asn	Phe	Tyr	Phe	Asp	Leu	Leu	Arg	Ala	Lys	Leu	
			180					185					190			
Asn	Asp	Val	Cys	Ala	Asn	Asp	Tyr	Cys	Gln	Ile	Pro	Phe	Asn	Leu	Lys	
		195					200					205				
Ile	Arg	Ala	Asn	Glu	Leu	Asp	Val	Leu	Lys	Lys	Leu	Val	Phe	Gly	Tyr	
	210					215					220					
Arg	Lys	Pro	Leu	Asp	Asn	Ile	Lys	Asp	Asn	Val	Gly	Lys	Met	Glu	Asp	
225					230					235					240	
Tyr	Ile	Lys	Lys	Asn	Lys	Lys	Thr	Ile	Glu	Asn	Ile	Asn	Glu	Leu	Ile	
				245					250					255		
Glu	Glu	Ser	Lys	Lys	Thr	Ile	Asp	Lys	Asn	Lys	Asn	Ala	Thr	Lys	Glu	
			260					265					270			
Glu	Glu	Lys	Lys	Lys	Leu	Tyr	Gln	Ala	Gln	Tyr	Asp	Leu	Ser	Ile	Tyr	
	275						280					285				
Asn	Lys	Gln	Leu	Glu	Glu	Ala	His	Asn	Leu	Ile	Ser	Val	Leu	Glu	Lys	
	290					295					300					
Arg	Ile	Asp	Thr	Leu	Lys	Lys	Asn	Glu	Asn	Ile	Lys	Glu	Leu	Leu	Asp	
305					310					315					320	
Lys	Ile	Asn	Glu	Ile	Lys	Asn	Pro	Pro	Pro	Ala	Asn	Ser	Gly	Asn	Thr	
			325						330					335		
Pro	Asn	Thr	Leu	Leu	Asp	Lys	Asn	Lys	Lys	Ile	Glu	Glu	His	Glu	Lys	
			340					345					350			
Glu	Ile	Lys	Glu	Ile	Ala	Lys	Thr	Ile	Lys	Phe	Asn	Ile	Asp	Ser	Leu	
	355					360					365					
Phe	Thr	Asp	Pro	Leu	Glu	Leu	Glu	Tyr	Tyr	Leu	Arg	Glu	Lys	Asn	Lys	
	370					375				380						
Asn	Ile	Asp	Ile	Ser	Ala	Lys	Val	Glu	Thr	Lys	Glu	Ser	Thr	Glu	Pro	
385					390					395					400	
Asn	Glu	Tyr	Pro	Asn	Gly	Val	Thr	Tyr	Pro	Leu	Ser	Tyr	Asn	Asp	Ile	
			405						410					415		
Asn	Asn	Ala	Leu	Asn	Glu	Leu	Asn	Ser	Phe	Gly	Asp	Leu	Ile	Asn	Pro	
			420					425					430			
Phe	Asp	Tyr	Thr	Lys	Glu	Pro	Ser	Lys	Asn	Ile	Tyr	Thr	Asp	Asn	Glu	
	435						440					445				
Arg	Lys	Lys	Phe	Ile	Asn	Glu	Ile	Lys	Glu	Lys	Ile	Lys	Ile	Glu	Lys	
	450					455					460					
Lys	Lys	Ile	Glu	Ser	Asp	Lys	Lys	Ser	Tyr	Glu	Asp	Arg	Ser	Lys	Ser	
465					470					475					480	
Leu	Asn	Asp	Ile	Thr	Lys	Glu	Tyr	Glu	Lys	Leu	Leu	Asn	Glu	Ile	Tyr	
				485					490					495		
Asp	Ser	Lys	Phe	Asn	Asn	Asn	Ile	Asp	Leu	Thr	Asn	Phe	Glu	Lys	Met	
			500					505					510			
Met	Gly	Lys	Arg	Tyr	Ser	Tyr	Lys	Val	Glu	Lys	Leu	Thr	His	His	Asn	
	515						520					525				
Thr	Phe	Ala	Ser	Tyr	Glu	Asn	Ser	Lys	His	Asn	Leu	Glu	Lys	Leu	Thr	
	530					535					540					
Lys	Ala	Leu	Lys	Tyr	Met	Glu	Asp	Tyr	Ser	Leu	Arg	Asn	Ile	Val	Val	
545					550					555					560	
Glu	Lys	Glu	Leu	Lys	Tyr	Tyr	Lys	Asn	Leu	Ile	Ser	Lys	Ile	Glu	Asn	
			565					570						575		
Glu	Ile	Glu	Thr	Leu	Val	Glu	Asn	Ile	Lys	Lys	Asp	Glu	Glu	Gln	Leu	
			580					585					590			
Phe	Glu	Lys	Lys	Ile	Thr	Lys	Asp	Glu	Asn	Lys	Pro	Asp	Glu	Lys	Ile	
	595						600					605				
Leu	Glu	Val	Ser	Asp	Ile	Val	Lys	Val	Gln	Val	Gln	Lys	Val	Leu	Leu	
	610					615					620					

Met	Asn	Lys	Ile	Asp	Glu	Leu	Lys	Lys	Thr	Gln	Leu	Ile	Leu	Lys	Asn	625	630	635	640
Val	Glu	Leu	Lys	His	Asn	Ile	His	Val	Pro	Asn	Ser	Tyr	Lys	Gln	Glu	645	650	655	
Asn	Lys	Gln	Glu	Pro	Tyr	Tyr	Leu	Ile	Val	Leu	Lys	Lys	Glu	Ile	Asp	660	665	670	
Lys	Leu	Lys	Val	Phe	Met	Pro	Lys	Val	Glu	Ser	Leu	Ile	Asn	Glu	Glu	675	680	685	
Lys	Lys	Asn	Ile	Lys	Thr	Glu	Gly	Gln	Ser	Asp	Asn	Ser	Glu	Pro	Ser	690	695	700	
Thr	Glu	Gly	Glu	Ile	Thr	Gly	Gln	Ala	Thr	Thr	Lys	Pro	Gly	Gln	Gln	705	710	715	720
Ala	Gly	Ser	Ala	Leu	Glu	Gly	Asp	Ser	Val	Gln	Ala	Gln	Ala	Gln	Glu	725	730	735	
Gln	Lys	Gln	Ala	Gln	Pro	Pro	Val	Pro	Val	Pro	Val	Pro	Glu	Ala	Lys	740	745	750	
Ala	Gln	Val	Pro	Thr	Pro	Pro	Ala	Pro	Val	Asn	Asn	Lys	Thr	Glu	Asn	755	760	765	
Val	Ser	Lys	Leu	Asp	Tyr	Leu	Glu	Lys	Leu	Tyr	Glu	Phe	Leu	Asn	Thr	770	775	780	
Ser	Tyr	Ile	Cys	His	Lys	Tyr	Ile	Leu	Val	Ser	His	Ser	Thr	Met	Asn	785	790	795	800
Glu	Lys	Ile	Leu	Lys	Gln	Tyr	Lys	Ile	Thr	Lys	Glu	Glu	Glu	Ser	Lys	805	810	815	
Leu	Ser	Ser	Cys	Asp	Pro	Leu	Asp	Leu	Leu	Phe	Asn	Ile	Gln	Asn	Asn	820	825	830	
Ile	Pro	Val	Met	Tyr	Ser	Met	Phe	Asp	Ser	Leu	Asn	Asn	Ser	Leu	Ser	835	840	845	
Gln	Leu	Phe	Met	Glu	Ile	Tyr	Glu	Lys	Glu	Met	Val	Cys	Asn	Leu	Tyr	850	855	860	
Lys	Leu	Lys	Asp	Asn	Asp	Lys	Ile	Lys	Asn	Leu	Leu	Glu	Glu	Ala	Lys	865	870	875	880
Lys	Val	Ser	Thr	Ser	Val	Lys	Thr	Leu	Ser	Ser	Ser	Ser	Met	Gln	Pro	885	890	895	
Leu	Ser	Leu	Thr	Pro	Gln	Asp	Lys	Pro	Glu	Val	Ser	Ala	Asn	Asp	Asp	900	905	910	
Thr	Ser	His	Ser	Thr	Asn	Leu	Asn	Asn	Ser	Leu	Lys	Leu	Phe	Glu	Asn	915	920	925	
Ile	Leu	Ser	Leu	Gly	Lys	Asn	Lys	Asn	Ile	Tyr	Gln	Glu	Leu	Ile	Gly	930	935	940	
Gln	Lys	Ser	Ser	Glu	Asn	Phe	Tyr	Glu	Lys	Ile	Leu	Lys	Asp	Ser	Asp	945	950	955	960
Thr	Phe	Tyr	Asn	Glu	Ser	Phe	Thr	Asn	Phe	Val	Lys	Ser	Lys	Ala	Asp	965	970	975	
Asp	Ile	Asn	Ser	Leu	Asn	Asp	Glu	Ser	Lys	Arg	Lys	Lys	Leu	Glu	Glu	980	985	990	
Asp	Ile	Asn	Lys	Leu	Lys	Lys	Thr	Leu	Gln	Leu	Ser	Phe	Asp	Leu	Tyr	995	1000	1005	
Asn	Lys	Tyr	Lys	Leu	Lys	Leu	Glu	Arg	Leu	Phe	Asp	Lys	Lys	Lys	Thr	1010	1015	1020	
Val	Gly	Lys	Tyr	Lys	Met	Gln	Ile	Lys	Lys	Leu	Thr	Leu	Leu	Lys	Glu	1025	1030	1035	1040
Gln	Leu	Glu	Ser	Lys	Leu	Asn	Ser	Leu	Asn	Asn	Pro	Lys	His	Val	Leu	1045	1050	1055	
Gln	Asn	Phe	Ser	Val	Phe	Phe	Asn	Lys	Lys	Glu	Ala	Glu	Ile	Ala		1060	1065	1070	
Glu	Thr	Glu	Asn	Thr	Leu	Glu	Asn	Thr	Lys	Ile	Leu	Leu	Lys	His	Tyr	1075	1080	1085	

Lys Gly Leu Val Lys Tyr Tyr Asn Gly Glu Ser Ser Pro Leu Lys Thr  
 1090 1095 1100  
 Leu Ser Glu Glu Ser Ile Gln Thr Glu Asp Asn Tyr Ala Ser Leu Glu  
 1105 1110 1115 1120  
 Asn Phe Lys Val Leu Ser Lys Leu Glu Gly Lys Leu Lys Asp Asn Leu  
 1125 1130 1135  
 Asn Leu Glu Lys Lys Lys Leu Ser Tyr Leu Ser Ser Gly Leu His His  
 1140 1145 1150  
 Leu Ile Ala Glu Leu Lys Glu Val Ile Lys Asn Lys Asn Tyr Thr Gly  
 1155 1160 1165  
 Asn Ser Pro Ser Glu Asn Asn Thr Asp Val Asn Asn Ala Leu Glu Ser  
 1170 1175 1180  
 Tyr Lys Lys Phe Leu Pro Glu Gly Thr Asp Val Ala Thr Val Val Ser  
 1185 1190 1195 1200  
 Glu Ser Gly Ser Asp Thr Leu Glu Gln Ser Gln Pro Lys Lys Pro Ala  
 1205 1210 1215  
 Ser Thr His Val Gly Ala Glu Ser Asn Thr Ile Thr Thr Ser Gln Asn  
 1220 1225 1230  
 Val Asp Asp Glu Val Asp Asp Val Ile Ile Val Pro Ile Phe Gly Glu  
 1235 1240 1245  
 Ser Glu Glu Asp Tyr Asp Asp Leu Gly Gln Val Val Thr Gly Glu Ala  
 1250 1255 1260  
 Val Thr Pro Ser Val Ile Asp Asn Ile Leu Ser Lys Ile Glu Asn Glu  
 1265 1270 1275 1280  
 Tyr Glu Val Leu Tyr Leu Lys Pro Leu Ala Gly Val Tyr Arg Ser Leu  
 1285 1290 1295  
 Lys Lys Gln Leu Glu Asn Asn Val Met Thr Phe Asn Val Asn Val Lys  
 1300 1305 1310  
 Asp Ile Leu Asn Ser Arg Phe Asn Lys Arg Glu Asn Phe Lys Asn Val  
 1315 1320 1325  
 Leu Glu Ser Asp Leu Ile Pro Tyr Lys Asp Leu Thr Ser Ser Asn Tyr  
 1330 1335 1340  
 Val Val Lys Asp Pro Tyr Lys Phe Leu Asn Lys Glu Lys Arg Asp Lys  
 1345 1350 1355 1360  
 Phe Leu Ser Ser Tyr Asn Tyr Ile Lys Asp Ser Ile Asp Thr Asp Ile  
 1365 1370 1375  
 Asn Phe Ala Asn Asp Val Leu Gly Tyr Tyr Lys Ile Leu Ser Glu Lys  
 1380 1385 1390  
 Tyr Lys Ser Asp Leu Asp Ser Ile Lys Lys Tyr Ile Asn Asp Lys Gln  
 1395 1400 1405  
 Gly Glu Asn Glu Lys Tyr Leu Pro Phe Leu Asn Asn Ile Glu Thr Leu  
 1410 1415 1420  
 Tyr Lys Thr Val Asn Asp Lys Ile Asp Leu Phe Val Ile His Leu Glu  
 1425 1430 1435 1440  
 Ala Lys Val Leu Asn Tyr Thr Tyr Glu Lys Ser Asn Val Glu Val Lys  
 1445 1450 1455  
 Ile Lys Glu Leu Asn Tyr Leu Lys Thr Ile Gln Asp Lys Leu Ala Asp  
 1460 1465 1470  
 Phe Lys Lys Asn Asn Asn Phe Val Gly Ile Ala Asp Leu Ser Thr Asp  
 1475 1480 1485  
 Tyr Asn His Asn Asn Leu Leu Thr Lys Phe Leu Ser Thr Gly Met Val  
 1490 1495 1500  
 Phe Glu Asn Leu Ala Lys Thr Val Leu Ser Asn Leu Leu Asp Gly Asn  
 1505 1510 1515 1520  
 Leu Gln Gly Met Leu Asn Ile Ser Gln His Gln Cys Val Lys Lys Gln  
 1525 1530 1535  
 Cys Pro Gln Asn Ser Gly Cys Phe Arg His Leu Asp Glu Arg Glu Glu  
 1540 1545 1550

Cys	Lys	Cys	Leu	Leu	Asn	Tyr	Lys	Gln	Glu	Gly	Asp	Lys	Cys	Val	Glu
		1555						1560					1565		
Asn	Pro	Asn	Pro	Thr	Cys	Asn	Glu	Asn	Asn	Gly	Gly	Cys	Asp	Ala	Asp
		1570					1575						1580		
Ala	Lys	Cys	Thr	Glu	Glu	Asp	Ser	Gly	Ser	Asn	Gly	Lys	Lys	Ile	Thr
1585					1590					1595					1600
Cys	Glu	Cys	Thr	Lys	Pro	Asp	Ser	Tyr	Pro	Leu	Phe	Asp	Gly	Ile	Phe
				1605					1610					1615	
Cys	Ser	Ser	Ser	Asn	Phe	Leu	Gly	Ile	Ser	Phe	Leu	Leu	Ile	Leu	Met
			1620					1625					1630		
Leu	Ile	Leu	Tyr	Ser	Phe	Ile									
		1635													